

### MODELS

#### *ESA Building Blocks*

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**RA4100 (rack)***146013-001***RA4100 Rack to Tower Conversion Kit***154253-B21***RA4000 (tower) Kit***241300-001***RA4000 Redundant Controller***223187-B21***FC-AL Switch 8***177862-B21***FC-AL Switch 3 Port Expansion Module***177863-B21***Fibre Channel Storage Hub 7***234453-001***Fibre Channel Storage Hub 12***295573-001***64-bit/66-Mhz Fibre Channel Host Adapter***120186-B21***Redundant Host Adapter Failover Software Kit***174681-B21*

This innovative SAN solution from Compaq delivers the best integration of scalability, capacity and price/performance for *ProLiant*™ servers, *ProLiant* clusters, and Multi-platform X86 servers. The RA4100 can scale from several GB to over 2.3 TB per server slot (using 18 GB drives) allowing you to purchase the storage capacity you need today and feel confident that you have enough bandwidth to easily expand in the future.

### OVERVIEW

#### **RAID Array 4100**

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The Compaq *StorageWorks*™ RAID Array 4100 is an external fibre channel storage product that has won numerous awards and industry accolades for outstanding scalability, flexibility and connectivity. Now, Compaq has added Multi-platform Intel-based server support to the RA4100 to allow a broad range of Intel-based servers to take advantage of the RA4100's scalability, flexibility and connectivity. The RA4100 utilizes the new "universal" drive carrier and will support a maximum of twelve, 1" Ultra2 hard drives in a single enclosure. With increasing storage growth and investments, customers are demanding "simple" and easy to manage storage solutions, that simplify deployment and management, and above all, lower total cost of ownership (TCO). The "universal" drive support on the RA4100 now achieves these benefits by enabling hot-swapping and migration of hard disk drives among the RA4100, *StorageWorks* Enclosure 4200, *ProLiant* servers and Compaq *AlphaServers*™. Now, Compaq customers can buy hard disk drives for their entire enterprise, from departmental servers up to the data center, without the confusion of disk and drive tray incompatibilities! The 4100 is an external storage system that is ideal for *ProLiant* Clusters, databases, data marts, Web servers, server consolidation, e-mail and other applications that require scalability and bandwidth for growing storage needs. The RA4100 is the storage subsystem used in Compaq's entry-level Microsoft Clustering product, the *ProLiant* Cluster HAF200, providing industry-leading price/performance. The RA4000 Redundant Controller can be added to existing RA4000 units and the new RA4100.

**COMPAQ**

### OVERVIEW *(continued)*

#### StorageWorks RA4100 SAN Solution

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The *StorageWorks* RA4100 SAN is an affordable solution that fulfills the SAN pillar of the Compaq ENSA strategy, providing a bridge to the Open SANs of tomorrow. This key solution will simplify storage management, manage explosive data growth, and reduce business down time. Delivering the ultimate SAN solution for heterogeneous x86 departmental and workgroup environments, the new *StorageWorks* Fibre Channel Arbitrated Loop (FC-AL) Switch 8 is a core component that makes it possible together with the RA4000 and or RA4100. Whether it be *ProLiant* or other industry standard servers, users can simultaneously deploy distributed business applications running in a mixture of NT, Windows 2000, NetWare, SCO Unix and Linux Operating Systems.

- **New Interconnect** - The FC-AL Switch 8 is a high performance switch engine interconnect component that will help you take that important step towards building a low cost SAN.
- **Storage consolidation with primary and secondary storage on the same SAN** - Using the *StorageWorks* FC-AL Switch 8 as the cornerstone of your SAN deployment, you can start by combining your primary storage components such as the RA4000 or RA4100 storage systems and secondary storage Enterprise Backup Solution (EBS) components such as Tape Libraries (TL890/TL891) on the same SAN.
- **Shared storage made simple** - Selective Storage Presentation firmware allows administrators to dynamically allocate and control access to storage pools down to the logical volume level.
- **Cluster Stabilization** - With a 12 GB/sec switch engine, the *StorageWorks* FC-AL Switch 8 delivers the necessary resiliency and speed to isolate your client-server network from heavier storage network traffic.
- **Affordable growth** - As your connection needs grow, the 8-port *StorageWorks* FC-AL Switch 8 can be expanded to 11 ports using the *StorageWorks* FC-AL Switch 3-Port Expansion Module.
- **Dedicated Bandwidth** - Built on the stable and mature FC-AL protocol, the *StorageWorks* FC-AL Switch 8 offers 8 or 11 ports with dedicated, non-blocking 100 MB/sec point-point parallel connections is the logical drop-in replacement for the Compaq FC-AL Hub 12.
- **Solution management made easy** - With management and configuration tools such as *StorageWorks* Command Console (SWCC), Compaq Insight Manager -XE (CIM-XE), Array Configuration Utility (ACU), and the *StorageWorks* Switch Management Utility, you can use the tools already in place today.

#### Multi-platform Intel-based Server Support

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Compaq now provides the unparalleled scalability, flexibility and connectivity benefits of the RA4100 to Intel-based servers. When used in an Intel-based server running Microsoft Windows NT 4.0 and Novell Netware 5.1, the RA4100 provides high availability, though redundant power supplies, fans, controllers and host adapters; flexibility, through the use of Fibre Channel based protocols; and connectivity, though a hub-based architecture. When used with a Compaq *ProLiant* server, the RA4100 also provides unparalleled integration with Insight Manager, Smart Start, and Pre-Failure Warranty support.

**Note:** Multi-platform Intel-based servers are only supported when running Microsoft Windows NT 4.0 (sp6) and Novell Netware 5.1 operating systems.

#### Pluggable Ultra2 Universal Hard Drives

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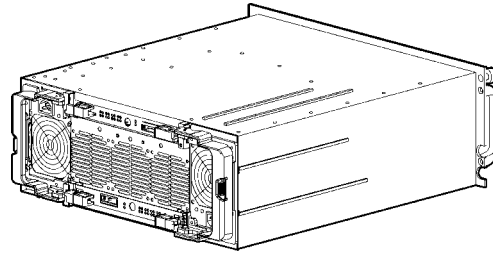
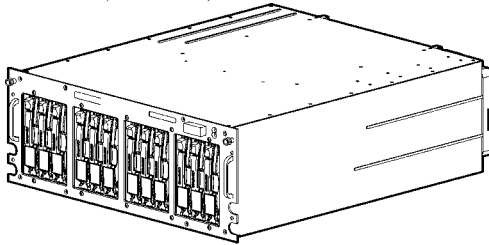
Compaq's new Ultra2 Universal disk drives provide an unequalled level of investment protection and simplification for our customers. With Ultra2 Universal compatibility across the enterprise, users are free to deploy and re-deploy these drives anywhere storage capacity is needed. Compaq Ultra2 Universal disk drives are the first high-performance hot plug drives sharing form factor compatibility across Compaq *ProLiant* servers, *AlphaServers*, and external storage solutions.

Compaq Ultra2 Universal drives are packaged in a new, unique Compaq designed hot pluggable drive carrier. This new hot pluggable drive carrier provides several enhancements including:

- Compact design for maximum storage density.
- Greater component commonality throughout the enterprise.
- Direct-connect design for increased signal integrity.
- Improved drive cooling essential for today's high-performance drives.
- Better vibration damping for improved performance.
- Recipient of 1999 Gold IDEA award for design excellence.

Compaq Ultra2 Universal drives are tested and proven under the extensive Compaq drive qualification program and are backed by Compaq drive warranty and pre-failure warranty. These drives have been configured and tested in all supported applications to ensure immediate, flawless integration into Compaq systems. Thus, risk of incompatibility is eliminated and customer's time to success is accelerated.

### OVERVIEW *(continued)*



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#### Fibre Channel Technology

Fibre Channel is a new industry-standard interconnect and high-performance serial I/O protocol that shatters the limitations of data transmission, storage capacity, and cabling distances associated with SCSI. The RA4100 uses Fibre Channel and a modular design to deliver a highly scalable, reliable, standards-based storage solution for explosive growth in the enterprise. The system integrates seamlessly into your Compaq *ProLiant* server environment while protecting your SCSI HDD investment. For additional availability, Compaq has partnered with Microsoft and Novell to integrate support for clustering.

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#### The Smart Array Advantage

As an extension to the Smart Array controller product line, the RA4000 Controller delivers the benefits that you have come to expect from Compaq RAID products.

**Data Compatibility** between generations of controllers means customers can upgrade from previous generation Smart Array products to get to higher performance, capacity and availability. Unlike competitive products, successive generations of Smart Array products understand the data format of other Smart Array controllers. Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center for details.

**Consistent Configuration and Management Tools.** All Smart Array products utilize a standard set of management and utility software. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain the Compaq server storage. Configuration, management and diagnostic software tools includes: Array Configuration Utility, Array Diagnostic Utility, Compaq Insight Manager (CIM), and Compaq SmartStart.

**Snap Shot Backup and Restore.** Compaq delivers the next step towards the Enterprise Network Storage Architecture vision with support for *StorageWorks* Virtual Replicator. With this optional software, users can instantly create "snapshots" of production data to reduce backup and restore windows from hours to minutes, pool storage for quick response to changing storage capacity needs, create "virtual volumes" of up to one terabyte and enjoy policy-based automation to simplify system data and storage management.

**Pre-Failure Warranty** means that CIM not only tells you when a drive is going bad, but allows you to replace drives before they fail.

**Note:** Pre-Failure Warranty allows for the replacement of designated drives in an RA4100 before they actually fail when using Compaq Insight Manager on Compaq servers.

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#### RA4100 Components

With the following components, your server's storage capacity and performance can be scaled to new levels:

**RAID Array 4100 Rack:** Houses up to 12, 1-inch hot pluggable drives. Each array includes the RA4000 Controller, an integrated RAID controller based on Compaq's 6th generation Smart Array technology, with 64-MB (16-MB read, 48-MB user selectable read/write battery-backed) cache, a 2 meter Multi-Mode Fibre Channel Cable and GBIC-SW Kit to link your storage to the FC-AL backbone.

**RA4000 Redundant Controller:** Based on Compaq's sixth generation RAID technology, this redundant array controller adds a higher level of availability not found previously in Compaq storage systems. Using this redundant controller requires software found on SmartStart 4.3 or later (for Netware or Windows NT) and in the Compaq *ProLiant* Cluster HA/F200 Kit (for both non-clustered Windows NT and Microsoft NT Cluster Server). Clustered Netware environments will be supported in SmartStart 4.4. Unixware is supported in SmartStart 4.4 or later. Utilizing technology developed for our SMART-2 family of array controllers, the RA4000 Redundant Controller fully supports Array Configuration Utility, Compaq Insight Manager, Pre-Failure Warranty, and Fibre Channel Host Adapter failover.

**FC-AL Switch 8:** This is an 8-port, 12 Gigabit/second, non-blocking FC-AL Switch that is the core interconnect that enables an affordable RA4100 SAN solution. As your connectivity needs grow the FC-AL Switch 8 can be expanded to a total of 11-ports using the FC-AL Switch 3-Port Expansion Module.

**FC-AL Switch 3:** This is a 3-Port Expansion Module that will expand your FC-AL Switch 8 to offer a total of 11-ports.

**Fibre Channel Storage Hub 7:** This is a non-intelligent, unmanaged Storage Hub which attaches up to six RA4100s to the Fibre Channel Host Adapter for support of up to seventy-two 1-inch hard drives per server slot. Compaq recommends the Fibre Channel Storage Hub 7 for most configurations because it provides the best value.

### OVERVIEW *(continued)*

#### RA4100 Components *(continued)*

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**Fibre Channel Storage Hub 12:** This is an intelligent, unmanaged Storage Hub which attaches up to 11 RA4100s to the Fibre Channel Host Adapter for support of up to one hundred thirty-two 1-inch hard drives per server slot.

**Note:** Currently, when using Microsoft Cluster Server with the Fibre Channel Storage Hub 12, a maximum of 5 RA4000 or RA4100 enclosures is supported. Support for additional enclosures beyond 5 is planned.

**Choosing the right Storage Hub:** Choose the Fibre Channel Storage Hub 7 if total solution cost and simplicity are the key requirements. Choose the Fibre Channel Storage Hub 12 if maximum capacity and future manageability are the key requirements.

**Fibre Channel Host Adapters:** PCI Fibre Channel Host Adapters operating at either 64-bit/66-Mhz or 32-bit/33-MHz are the link between your Compaq ProLiant or Intel-based non-Compaq server and the RA4100.

**Gigabit Interface Converters Kits (GBIC-SW and GBIC-LW):** Compaq partnered with Sun and AMP to design these industry-standard connection devices which hot plug into Fibre Channel hubs, array controllers, and host adapters. These converters provide expansion ease and 100 MB/s performance. GBIC-SW modules support distances of up to 500 meters using multi-mode fiber optic cable and GBIC-LW modules support distances of up to 10 kilometers or over 6 miles using single-mode optical fiber.

**Multi-Mode Fibre Channel Cables:** 2, 5, 15, 30 and 50 meter cables provide a thin, flexible cabling solution between GBICs, and are immune to electromagnetic interference.

**Redundant Host Adapter Failover Software Kit:** This software kit includes all necessary drivers and documentation to configure and enable host adapter failover for Microsoft Windows NT 4.0 and Novell Netware 5.1. Redundant array controller and host adapter failover will be supported in the future on Microsoft Windows 2000.

#### Scalability

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Capacity, cache, memory and processing power scale simultaneously as you add RA4100s, allowing you to purchase storage for your current needs while providing enough bandwidth and flexibility for substantial growth in the future.

#### Fault Tolerance

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Keeps data available and server running while drive is being replaced; several fault tolerance configurations are supported including:

**Distributed Data Guarding (RAID 5):** Allocates parity data across multiple drives and allows simultaneous write operations.

**Data Guarding (RAID 4):** Writes parity data to a single, designated drive.

**Drive Mirroring (RAID 1, 0+1):** Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

#### Capacity

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**Per Array:** Using 36.4-GB drives, a single RA4100 can scale up to 436.8 GB.

**Per Loop:** Add a Fibre Channel Storage Hub 12 and scale up to 4.8 TB per server slot.

#### Fault Recovery

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Minimizes downtime, reconstructs data, and facilitates a quick recovery from drive failure

**On-Line Spares:** Up to four spare drives can be installed prior to drive failure. If a failure occurs, recovery begins with an on-line spare and data is reconstructed automatically.

**Array Accelerator:** Onboard, battery-backed cache memory protects data in the event of a power failure. This daughter board is uniquely removable from the array in the unlikely event of a controller failure—saving critical user data for up to four days.

#### High Availability

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Saves training and administration costs by providing online storage management tools:

**Microsoft NT Cluster Server and Novell NetWare High Availability Server:** Compaq was the first company to deliver support for Microsoft Cluster Server (MSCS) on Fibre Channel attached storage.

*(Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center for details.)*

In addition, Compaq has the only Fibre-based storage for NetWare High Availability Server.

**Online RAID Level Migration:** allows for online post-configuration change to RAID level without destroying data or volume information.

**Online Capacity Expansion:** lets you add storage to a live server—reducing expensive server downtime.

### OVERVIEW *(continued)*

#### High Availability *(continued)*

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**Online Volume Extension:** allows for the capacity growth of existing logical volumes.

**Global Online Spare:** reduces the risk of data loss by facilitating automatic rebuilds after a drive failure.

**Logical Drive Capacity Extension:** allows the user to increase the size of existing logical drives online under Windows NT and offline for other operating systems.

**Pre-Failure Warranty:** Drives installed in an RA4100 and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty.

*Note:* Pre-Failure Warranty allows for the replacement of designated drives in an RA4100 before they actually fail when using Compaq Insight Manager on Compaq servers.

*Note:* Some operating systems may not support all of these features.

#### StorageWorks Virtual Replicator (SWVR)

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**Snapshots.** Using SWVR, instantly create “snapshots” of production data to reduce backup and restore windows from hours to minutes.

**Storage Pools.** For quick response to changing storage capacity needs, create “virtual volumes” of up to two terabytes with SWVR and enjoy policy-based automation to simplify system data and storage administration.

The software part number is 388931-001 and can be ordered by contacting your local Compaq sales office. System requirements for the software are Windows NT 4.0 SP3, IE 3.02, 32-MB memory, and 30 MB disk space.

#### Compaq Integration

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Both the Compaq RA4000 and RA4100 were designed and integrated specifically for use with Compaq *ProLiant* servers, hard drives and RAID systems, so you can be confident that it will integrate seamlessly into your Compaq Server environment.

#### Multi-platform X86-based Server Support

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When used in an Intel-based server running Microsoft Windows NT 4.0 or Novell Netware 5.1, the RA4100 provides high availability, though redundant power supplies, fans, controllers (NT and Netware only), and host adapters; flexibility, through the use of Fibre Channel based protocols; and connectivity, though a hub-based architecture. When used with a Compaq *ProLiant* server, the RA4100 also provides unparalleled integration with Insight Manager, Smart Start, and Pre-Failure Warranty support.

*Note:* Multi-platform Intel-based servers are only supported when running Microsoft Windows NT 4.0 (sp6) and Novell Netware 5.1 operating systems.

#### Hot Pluggable Support

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RA4000 Controller supports hot pluggable drives for simple installation and maintenance. In addition, drives are covered by Compaq's Pre-Failure Warranty. Compaq Insight Manager will notify you of a potential drive failure before it happens, so that the drive may be replaced.

*Note:* Pre-Failure Warranty allows for the replacement of designated drives in an RA4100 before they actually fail when using Compaq Insight Manager on Compaq servers.

#### Easy Installation

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Multi-mode fiber optic cables, which are much less bulky than SCSI cables, simplify installation. Distances of up to 500 meters between your server and storage systems are supported on 50-micron, multi-mode, fiber optic cable (200 meters on 62.5-micron multi-mode fiber optic cable). For even greater distances, 9-micron single mode fibre optic cable can be used to achieve 10-kilometer distances between RA4000 family components. In addition, integration with the Compaq Array Configuration Utility and SmartStart ensures quick and easy storage configuration.

*Note:* For more information about cabling and installation, refer to <http://compaq.com/products/servers/storage/fc-whitepapers.html>.

#### Low Total Cost of Ownership

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You can buy what you need today and purchase additional capacity and performance as your information grows, instead of making a large up-front investment. More storage systems, controllers and expansion modules can be easily added as your needs dictate. Also, because the arrays support SCSI drives, your investment in SCSI technology is protected and cost is minimized as you add new drives.

Sharing of a common universal drive form factor between your server, external storage enclosures, and fibre channel array can significantly reduce needs for hardware and spare inventory, and offer overall reduction in storage management and business costs.

### SOFTWARE COMPONENTS

Compaq storage server and Smart Array software makes setup storage management, configuration and trouble-shooting a breeze. Compaq storage servers and Smart Array products utilize a single, consistent set of utility software for storage and RAID management. This consistency across the Smart Array product line reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your Compaq server storage solution.

#### Array Configuration Utility & Array Diagnostic Utility

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- Powerful configuration and diagnostic utilities for all Smart Array controllers
- Provides a graphical view of Compaq drive array configurations
- Easy to use Wizards for configuration
- Runs online on NT 4.0 and NetWare

#### Selective Storage Presentation

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- Allows setting of access rights to RA4000/RA4100 storage by host and or/cluster.
- Access Control can be set up to a logical volume level.
- Built-in to RA4000 controller firmware. Upgrades possible through SmartStart CD Version 4.8 for older RA4000 controllers.

#### Compaq Insight Manager

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- Powerful server and server options/storage manager tool
- Monitors over 1,200 different server parameters

#### SmartStart

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- Simple to use server and storage installation tools

#### Redundant Host Adapter Failover Software (separate option kit required)

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- Support dual host adapters and dual fibre loops

#### OS Support

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- NT 4.0 (sp6)
- Windows 2000
- NetWare (4.2, 5.1)
- SCO OpenServer 5.x
- SCO UnixWare7.x
- Warp 3.0 family
- Redhat Linux 6.2

#### Software Certifications

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- Microsoft Cluster Server Certification
- Novel High Availability Server Certification
- Novel Cluster Services Certification

#### Warranty

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Three-year, on-site Limited Warranty for RA4100s, Fibre Channel Cables and GBIC-SW; the greater of one-year Limited Warranty or the remaining Server Warranty for Fibre Channel Host Adapters.

**Note:** Certain restrictions and exclusions apply. Consult the [Compaq Customer Support Center](#) for details.

### SERVICE & SUPPORT, CAREPAQ AND WARRANTY INFORMATION

#### Software Product Services

- Standalone telephone support
- Rights to new license version
- Media and documentation updates

#### Hardware Product Services

- Installation services
- On-site maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage
- RAID setup and performance consulting via statement of work

For additional hardware installation and maintenance information, please refer to the URLs listed below:

[http://www.compaq.com/services/carepaq/cp\\_installation.html](http://www.compaq.com/services/carepaq/cp_installation.html)

[http://www.compaq.com/services/carepaq/cp\\_hardware.html](http://www.compaq.com/services/carepaq/cp_hardware.html)

#### Warranty Upgrade Options

- Response - Upgrade on-site response from next business day to same day 4 hours
- Coverage - Extend hours of coverage from 9 hours x 5 days to 24 hours x 7 days
- Duration - Select duration of coverage for a period of 1, 3, or 5 years

#### CarePAQ Information

Sample part numbers:

- FM-\*\*XHW-36, 3 year, uplift to 5 x 9, Next Day Response
- FM-\*\*4HR-36, 3 year, uplift to 5 x 9, 4-hour Response
- FM-\*\*724-36, 3 year, uplift to 7 x 24, 4-hour Response

\*\* represents a two digit product specific code

- CarePAQ is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.
- CarePAQ is not available for less than the product's warranty duration.
- CarePAQ is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- CarePAQ services are prepaid.

For additional CarePAQ (hardware & software) information, as well as orderable part numbers, please refer to the URL listed below:

<http://www.compaq.com/services/carepaq/index.html>

#### Components

The following brick level options/components do not have individual CarePAQs. These items will be included in product CarePAQs into which they are installed.

Disk Drives	Tape Drives	CD/DVD ROM	SCSI Hubs in SBBs	Adapters
Bus Converters	Backplane RAID Controllers	Power Supplies	Cabling	Fans

### SPECIFICATIONS

RAID Array 4100	Dimensions (HxWxD)	Rack	6.9 x 22.9 x 19 in/17.5 x 58.2 x 48.3 cm
	Weight	Rack	33.58 lbs/15.5 kg
	LED Indicators on Front Panel (2)	Power, Service Required	
	LED Indicators for Drive Modules	Drive Access (center)	
		Online (left)	
		Drive Failure (right)	
	LED Indicators on Rear Panel	Fan Module (fault)	
		Power Supply (online and fault status)	
	Interface	Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2	
	Maximum Number of Drives	1-inch Drives	12
	Temperature Range	Operating	50° to 86°F/10° to 35°C
		Shipping	-20° to 140°F/-30° to 60°C
	Relative Humidity	Operating	20% to 80%
		Non-operating	5% to 90%
	Input Requirements	Nominal Line Voltage	110 to 120 VAC/220 to 240 VAC
		Range Line Voltage	90 to 264 VAC
		Line Frequency	47 to 63 Hz
		Typical Input Current	2.5 A at 120 VAC
RAID Array 4000	Power (Watts) (The RA4100 Array ships standard with a redundant power supply.)	Output Power	350 Watts per supply
	Power Supply Weight	7.34 lbs	
	Dimensions (HxWxD)	Tower	20.5 x 25 x 10.8 in/52 x 63.5 x 27.4 cm
		Rack	6.9 x 22.9 x 19 in/17.5 x 58.2 x 48.3 cm
	Weight	Tower	50.08 lbs/22.7 kg
		Rack	33.58 lbs/15.5 kg
	LED Indicators on Front Panel (2)	Power, Service Required	
	LED Indicators for Drive Modules	Online (left)	
		Drive Access (center)	
		Drive Failure (right)	
	LED Indicators on Rear Panel	Fan Module (fault)	
		Power Supply (online and fault status)	
	Interface	Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2	
	Maximum Number of Drives	1-inch Drives	12
		1.6-inch Drives (RA4000 only)	8
	Temperature Range	Operating	50° to 86°F/10° to 30°C
	Shipping	-20° to 140°F/-30° to 60°C	
	Relative Humidity	Operating	20% to 80%
		Non-operating	5% to 90%
	Input Requirements	Nominal Line Voltage	110 to 120 VAC/220 to 240 VAC
		Range Line Voltage	90 to 264 VAC
		Line Frequency	47 to 63 Hz
		Typical Input Current	2.5 A at 120 VAC
	Power (Watts)	Output Power	350 Watts per supply
RAID Array 4000 Controller	Protocol	Fibre Channel Arbitrated Loop to Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2	
	LED Indicators on Rear Panel by GBIC Slot	GBIC Transmit Status GBIC Receive Status	



### SPECIFICATIONS *(continued)*

RAID Array 4000 Controller <i>(continued)</i>	Drive Interface	Electrical	Single-ended
		Drive Transfer Channels	2 simultaneous
		Total Transfer Rate	80 MB/s (40 MB/s per channel)
	Drives Supported	Up to six Wide Ultra2 Universal Hard Drives	
	Data Transfer Method	SCSI over FC-AL	
	Maximum Transfer Rate (on 100 MB/s Fibre Channel Arbitrated Loop)		
	Software Upgradable Firmware	Yes	
	Cache	64 MB total. 16 MB ECC protected read + 48-MB battery-backed ECC protected and corrected user selectable read/write	
	Logical Drives Supported	32 (8 on MS NT)	
	Reliability Features	Distributed Data Guarding (RAID 5)	Yes
StorageWorks FC-AL Switch Technical Specifications		Data Guarding (RAID 4)	Yes
		Drive Mirroring (RAID 1)	Yes
		Data Striping (RAID 0)	Yes
		RAID 0+1	Yes
		Automatic Data Recovery	Yes
Switch Management Specifications	Switch Engine	12 Gb/s	
	Communication Modes	Full Duplex	
	Data Transfer Latency	< 280 - 500 nanosecond range	
	Number of Expansion Slots	One 3-Port Expansion Module (for 8-port to 11-port expansion)	
	Protocols Supported	FC-AL, FC-AL-2, FC-PH, FC-PH-2, FC-PH-3, FC-PLDA, FCP	
Physical Characteristics and Ordering Information	Switch Management Access	Local Console Via RS232, SNMP via 10BaseT	
	Switch Management Interface	ASCII via RS232, SNMP via 10baseT, <i>StorageWorks</i> Command Console (SWCC), Compaq Insight Manager (CIM) and CIM XE, <i>StorageWorks</i> Switch Management Utility	
	Management Standards	IETF Fibre Channel Management MIB, Fabric Element MIB	
	Packaging	SW FC-AL Switch 8 (Part No. 177862-B21) SW FC-AL Switch 3-Port Expansion Module (Part No. 177863-B21)	
Fibre Channel Storage Hub 7	Dimensions (HxWxD)	(Applies to 8-port and 11-port chassis)	1.66 x 17.3 x 16.26 in/ 42 x 439 x 413 mm
	Weight	8 port Chassis	24.9 lbs/11.2 kg
		3 port Expansion Module	2.1 lbs/0.95 kg
	Relative Humidity (non-condensing)	Operating	20% to 80% non-condensing
		Shipping	
	Power	100-240 VAC, 50-60 Hz	
	Power Supply	1.5A, 100 W, Fixed	
	Temperature Range	Operating	50°F to 140°F/10°C to 60°C
		Shipping	-22°F to 140°F/-30°C to 60°C
	Dimensions (HxWxD)	1.69 x 8.6 x 14.75 in/4.3 x 21.8 x 37.5 cm	
Fibre Channel Storage Hub 7	Weight	6 lbs/2.7 kg	
	Media Interface	Short or long wave, optical, hot pluggable	
	Maximum Number of Devices/Ports	Seven	
	LED Indicators on Front Panel	GBIC status	Green
		Port Fault/Bypass	Amber
	Temperature	Operating	32° to 132°F/0° to 50°C
	Relative Humidity (non-condensing)	5% to 95%	
	Input Requirements	Range Line Voltage	100 to 250 VAC
		Line Frequency	50 to 60 Hz
	Power (Watts)	All ports empty	25 Watts
Fibre Channel Storage Hub 7		All ports in use at 251 mA each	35 Watts

### SPECIFICATIONS *(continued)*

<b>Fibre Channel Storage Hub 12</b>	<b>Dimensions (HxWxD)</b>	1.66 x 17.1 x 17.2 in/ 4.2 x 43.4 x 43.7 cm	
	<b>Weight</b>	10.5 lbs/4.8 Kg	
	<b>Media Interface</b>	Short or long wave, optical, hot pluggable	
	<b>Maximum Number of Devices/Ports</b>	12	
	<b>LED Indicators on Front Panel</b>	GBIC status (green)	
		Port Fault/Bypass (amber)	
	<b>Temperature</b>	Operating	32° to 132°F/0° to 50°C
	<b>Relative Humidity (non-condensing)</b>	5% to 95%	
	<b>Input Requirements</b>	Range Line Voltage	100 to 250 VAC
		Line Frequency	50 to 60 Hz
<b>64-bit/66-MHz Fibre Channel Host Adapter</b>	<b>Power (Watts)</b>	All ports empty	
		All ports in use at 251 mA each	
	<b>Protocol</b>	25 Watts	
		35 Watts	
	<b>Data Transfer Method</b>	PCI Model	64-bit/66-MHz PCI bus-master
<b>Fibre Channel Host Adapter</b>	<b>Maximum Transfer Rate (on 100 MB/s Fibre Channel Arbitrated Loop)</b>	Fibre Channel Arbitrated Loop	
	<b>LED Indicators on Slot Panel</b>	GBIC Transmit Status	
		GBIC Receive Status	
	<b>Protocol</b>	Fibre Channel Arbitrated Loop	
<b>Multi-Mode Fibre Channel Cables Kits</b>	<b>Data Transfer Method</b>	PCI Model	32-bit/33-MHz PCI bus-master
	<b>Maximum Transfer Rate (on 100 MB/s Fibre Channel Arbitrated Loop)</b>	Fibre Channel Arbitrated Loop	
	<b>LED Indicators on Slot Panel</b>	GBIC Transmit Status	
		GBIC Receive Status	
	<b>Protocol</b>	Fibre Channel Arbitrated Loop	
<b>Fibre Channel Troubleshooting Kit</b>	<b>Cable Type</b>	50 micron multi-mode fiber	
	<b>Available Cable Lengths</b>	6.5, 16.25 and 48.75 ft/2, 5, 15, 30 and 50 meter	
	<b>FC Troubleshooting Guide</b>	Comprehensive guide which describes the components of the FCSS, the functions of the Fibre Fault Isolation Utility and provides flowcharts for troubleshooting the FCSS	
	<b>Serial Port Cable</b>	Enables out-of-band User Diagnostics via a laptop or PC to test FC Array & Array Controller functionality and FC link integrity (via Loopback Cable and Duplex Adapter)	
	<b>PC Companion Cable</b>	Enables out-of-band user diagnostics via a PC Companion to test FC Array Controller functionality	
	<b>FC Short Wave Loopback Cable</b>	Enables complete FC link testing with the FC Array Diagnostic Utility	
	<b>FC Duplex Adapter</b>	Enables FC cable testing with the FC Array Diagnostic Utility	
	<b>Gigabit Interface Converter Cleaning Kit</b>	Enables GBIC and FC Cable optics cleaning	

### RELATED OPTIONS

<b>Hard Drives</b>	36.4-GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm, (1")	176496-B22
	9.1-GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm, (1")	142671-B22
	18.2-GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm, (1")	142673-B22
	18.2-GB Pluggable Ultra2 Universal Hard Drive, 7200 rpm, (1")	128418-B22
	9.1-GB Pluggable Ultra2 Universal Hard Drive, 10,000 rpm, (1")	388144-B22
	9.1-GB Pluggable Ultra2 Universal Hard Drive, 7200 rpm, (1")	328939-B22

### RELATED OPTIONS *(continued)*

Cabling	GBIC-SW Connector Kit (2 ea.)	234459-B21
	GBIC-LW Connector Kit (2 ea.)	340412-B21
	2 m Multi-Mode Fibre Channel Cable	234457-B21
	5 m Multi-Mode Fibre Channel Cable	234457-B22
	15 m Multi-Mode Fibre Channel Cable	234457-B23
	30 m Multi-Mode Fibre Channel Cable	234457-B24
	50 m Multi-Mode Fibre Channel Cable	234457-B25
Other	Redundant Host Adapter Failover Software Kit	174681-B21
	RA4000 Redundant Controller	223187-B21
	RA4000 Redundant Power Supply (The RA4100 Array ships standard with a redundant power supply.)	224206-001
	FC-AL Switch 8	177862-B21
	FC-AL Switch 3-Port Expansion Module (Required to expand the FC-AL Switch 8 to 11 ports)	177863-B21
	Fibre Channel Storage Hub 12	295573-001
	Fibre Channel Storage Hub 7	234453-001
	RA4100 Rack to Tower Conversion Kit	154253-B21
	Fibre Channel Storage Hub 7 Universal Rack Mount Kit	136127-B21
	RA4000 Upgrade Kit for the <i>ProLiant</i> Storage System /F and /U	296324-B21
	Fibre Channel Array Controller 64-MB Cache Upgrade Kit	262398-B21
	Fibre Channel Troubleshooting Kit	234468-B21
	Compaq 9142 Rack	120663-B21, -B22, -B23
	Compaq 9136 Rack	120664-B21, -B22, -B23
	Compaq 9122 Rack	120665-B21, -B22, -B23
	Compaq 7142 Rack	165753-001

### COMPATIBILITY

#### Servers

Compaq *ProLiant* 8500 Xeon™  
 Compaq *ProLiant* 8000 Xeon  
 Compaq *ProLiant* 7000 Xeon  
 Compaq *ProLiant* 6500 Xeon  
 Compaq *ProLiant* 6400R Xeon  
 Compaq *ProLiant* 6000 Xeon  
 Compaq *ProLiant* 5500R Xeon  
 Compaq *ProLiant* 5500 Xeon  
 Compaq *ProLiant* 3000R 6/450, 6/500, 6/550 MHz  
 Compaq *ProLiant* 3000 6/450  
 Compaq *ProLiant* 1850R 6/500, 6/550  
 Compaq *ProLiant* 1600R 6/400, 6/450, 6/500, 6/550  
 Compaq *ProLiant* 1600 6/350, 6/400, 6/450, 6/500, 6/550  
 Compaq *ProLiant* 1200  
 Compaq *ProLiant* 800 6/350E, 6/400, 6/450, 6/500, 6/550 MHz  
 Any Intel-based server (Multi-platform Intel-based servers are only supported when running Microsoft Windows NT and NetWare operating system.)